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ENTOMOLOGICAL NEWS

DECEMBER 1958

Vol. LXIX **No. 10**

CONTENTS

Swartzendruber—Permeability of sensory hairs 253

Hungerford and Matsuda—Another generic entity of Gerridae .. 258

Svihla—The nymph of Tanypteryx hageni 261

Hungerford, Leidy Medalist 266

American Entomological Society Centennial 267

Indexes and title page to Volume LXIX 269

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: H. J. GRANT, JR., E. J. F. MARX, M. E. PHILLIPS, and J. A. G. REHN.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS: Communications and remittances to be addressed to **Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISEMENTS: Rate schedules available on request. Address, **Fred B. Jacobson, Advertising Manager, Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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Plates printed one side: First 50, $3.15; Additional 100's, $2.37.

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ENTOMOLOGICAL NEWS

VOL. LXIX DECEMBER, 1958 No. 10

The Permeability of Certain of the Sensory Hairs on the Antennae of Lacewings (Neuroptera: Chrysopidae)

By DONALD C. SWARTZENDRUBER, Department of Zoology, State University of Iowa, Iowa City, Iowa

INTRODUCTION

Slifer (1954) reported that the largest of the basiconic sensilla which are present on the antennae of grasshoppers are permeable at the distal tip to aqueous solutions of dyes, such as acid fuchsin, both in the living condition and in preserved material. Trichoid sensilla and two smaller types of basiconic sensilla as well as coeloconic sensilla present on the antennae were found, at that time, to be unaffected by the dye. Later, coeloconic sensilla were found by Slifer (1955) also to be permeable at the distal tip to a dye solution. In 1956, Slifer reported that two smaller types of basiconic sensilla were permeable to dyes, though not at the distal end of the sense organ, but at or near the base of the peg. The evidence presented indicates either (1) that the waxy or lipoid layer of the cuticle which imparts the property of impermeability must be missing from the tips of the largest basiconic sensilla and from a small area near the base of the smaller pegs, or (2) that the entire cuticle must be missing in these areas in the grasshopper. Slifer (1954, p. 127) states that: "Whether insects other than grasshoppers also possess basiconic pegs which are permeable to water and dyes is not known with certainty at present. A few adults belonging to other orders (Collembola, Thysanura, Dermaptera, Isoptera, Neuroptera, Coleoptera, Hymenoptera and

Diptera) were tested with interesting but inconclusive results." It is the purpose of this paper to show that in the living lacewing the distal end of certain of the sensory hairs present on the antenna is permeable to aqueous solutions of a dye.

The sense organs which are present on the antenna of the lacewing, *Chrysopa perla* Linnaeus, were described by Hauser (1880) as tactile bristles (*Tastborsten*) and pegs (*Zäpfchen*). Ruland (1888) described curved or arched pegs (*knieförmig gebogenen Zäpfchen*) which are present on the antenna of the same species. Röhler (1906) briefly reviewed the literature concerning neuropteran antennal sense organs and stated that in 1894 Nagel found the curved or arched pegs only at the distal end of each subsegment of the flagellum and noted nearby the presence of fine or fragile (*äusserst zarte*) hairs.

Materials and Methods

Three species of adult lacewings—*Chrysopa oculata* Say, *Chrysopa plorabunda* Fitch, and *Chrysopa nigricornis* Burmeister [1]—were used in this study. Males and females were caught in the field and tested in the laboratory. Also, individuals of *C. plorabunda* and *C. oculata* were reared in the laboratory and tested just after emergence from the pupal cases in order to eliminate the possibility that the cuticle of the sense organs had been damaged in any way, and so made permeable to the dye. Directions for raising chrysopids are given by Smith (1937).

The method used to demonstrate the permeability of certain of the sensory hairs is that of Slifer (1954). Essentially it consists in bringing the living antennae into contact with a dye in aqueous solution for periods ranging from 15 minutes to 12 hours, dehydrating and clearing the antennae very rapidly, and mounting the antennae whole in resin. All experiments were performed at room temperature. Whole individuals which had been immersed in the stain as long as an hour showed complete recovery after removal, indicating that the tests are valid, as stated, for living material.

[1] The author wishes to thank Dr. W. E. Bickley, University of Maryland, who kindly made the species identification.

Results

Chrysopid antennae are long and thread-like and, in the species examined, ranged in length from 8 to 14 mm. The number of flagellar subsegments is large and an individual may have as many as a hundred. A camera-lucida drawing of a typical subsegment of *Chrysopa plorabunda* (fig. 1) shows the arrange-

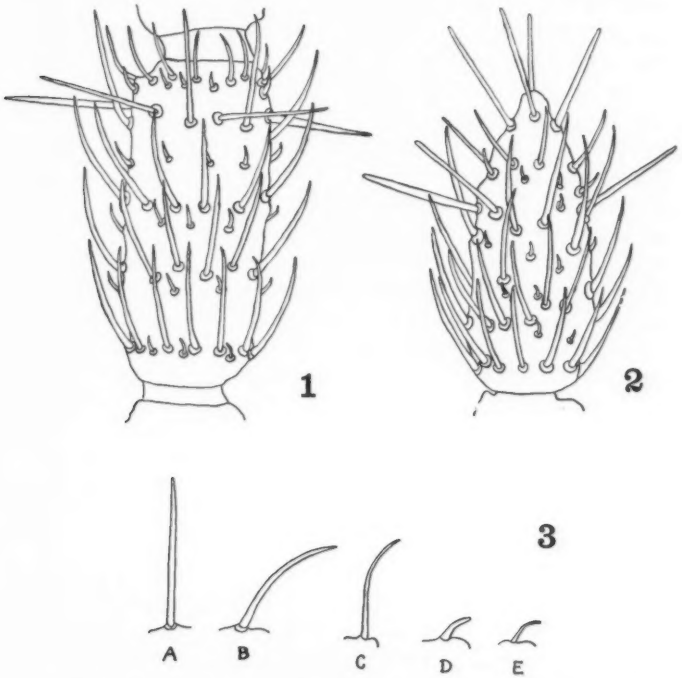

Fig. 1. A typical subsegment of *C. plorabunda* antenna showing the several types of sense hairs present. Long permeable hairs are in transverse row near the anterior end of subsegment. × 350.

Fig. 2. Terminal flagellar subsegment of *C. plorabunda* showing sensory hairs and the two transverse rows of long permeable hairs near anterior end. × 350.

Fig. 3. The five types of hairs found on lacewing antennae. *A* is permeable hair. The other types are apparently unaffected by the dye. × 350.

ment of the several types of sense organs present on it. Those of *C. oculata* and *C. nigricornis* are very similar. No differences between the antennae of males and females were noticed, either in the number of sense organs present, or in their distribution.

Sensory hairs on the antennae which have been found to be permeable at their distal tips to aqueous solutions of dyes are slender structures, 50 to 60 microns long, and are found only near the distal end of each flagellar subsegment. They are about 2.5 to 3 microns in diameter. A row of six hairs encircles each subsegment. They are spaced evenly around the surface of the subsegment. The hairs project outward from the surface in a plane nearly perpendicular to the long axis of the antenna. They are semi-transparent and their walls appear to be thin. Figure 3, a, shows a typical hair which is of the type described. When the antennae of living adult lacewings are brought in contact with an aqueous solution of acid fuchsin, treated and mounted on slides as described above, and then examined under a microscope, the tips of these hairs will be found to have retained some of the red stain. Only the distal end of the hair is colored, indicating that the dye has entered the structure at the tip. The remainder of the sense organ and the antennal surface are unaffected by the dye, except in instances where obvious damage to the cuticle has occurred. Other types of sense organs which are present on the antennae and in which, as yet, no permeable areas have been found are shown in fig. 3, *b, c, d,* and *e.*

The degree of penetration of the dye into the hair is affected by the time that the antenna is allowed to remain in contact with the dye solution. The stain enters the hair rapidly at first and then more slowly as evidenced by the fact that antennae immersed in the dye for varying periods of time up to two hours show the permeable hairs to be stained about the same amount. Periods of exposure over two hours show that the dye has diffused slowly down into the hair from the tip but usually not more than two or three microns after exposure for 12 hours. Adults tested shortly after emergence in the laboratory showed the same results as did the insects caught in the field. This

indicates that the penetration of the dye is not due to a damaged or abraded cuticle.

The terminal flagellar subsegment of an antenna of *C. plorabunda* is shown in fig. 2. The most notable difference between this subsegment and the typical subsegment in fig. 1 is the number of permeable hairs at the tip of the former. As in many insects, the tip of the flagellum in this species is more specialized than are the other antennal subsegments. The hairs at the tip of the terminal subsegment stain very readily in the dye solution. These hairs are of the same general size and structure as the permeable hairs described above. The tip of the flagellum usually contains at least six of these hairs in addition to the regular circle of six which is found in its normal location on the subsegment.

Discussion

The experimental evidence presented by Slifer (1955) for the long, permeable basiconic sensilla of the grasshopper suggests that they may serve as receptors for the common chemical sense and this may be true for the permeable hairs on the lacewing. These sensilla are permeable only at the distal end to solutions of a dye and so resemble the permeable hairs described on the grasshopper. The permeable hairs on the lacewing are located favorably for the reception of tactile stimuli and long, slender, movable hairs of this type are commonly believed to be tactile in function. It is possible that these hairs may have a dual function, i.e., they may respond both to touch and to chemicals as Dethier (1955) suggests for certain of the sense organs on the labellum of *Phormia*.

Summary

1. A description of the antennal subsegments and of the sense organs on the antennae is given for *Chrysopa oculata* Say, *Chrysopa plorabunda* Fitch, and *Chrysopa nigricornis* Burmeister.

2. Certain of the sensory hairs on the antennae are permeable at their distal tips to aqueous solutions of acid fuchsin in the living condition.

LITERATURE CITED

DETHIER, V. G. 1955. The physiology and histology of the contact chemoreceptors of the blowfly. Quart. Rev. Biol., 30: 348–372.

HAUSER, G. 1880. Physiologische und histiologische Untersuchungen über das Geruchsorgan der Insekten. Z. wiss. Zool., 34: 367–403.

RÖHLER, E. 1906. Beiträge zur Kenntnis der Sinnesorgane der Insekten. Zool. Jahrb. Abt. Anat. u. Ont., 22: 225–288.

RULAND, F. 1888. Beiträge zur Kenntnis der antennalen Sinnesorgane bei Insekten. Z. wiss. Zool., 46: 602–628.

SLIFER, E. H. 1954. The permeability of the sensory pegs on the antennae of the grasshopper (Orthoptera, Acrididae). Biol. Bull., 106: 122–128.

——. 1955. The detection of odors and water vapor by grasshoppers (Orthoptera, Acrididae) and some new evidence concerning the sense organs which may be involved. Jour. Exper. Zool., 130: 301–317.

——. 1956. Permeable spots in the cuticle of the thin-walled pegs on the antennae of the grasshopper. Sci., 124: 1203.

SMITH, R. C. 1937. *In* Culture Methods for Invertebrate Animals, ed. by J. G. Needham, Comstock Publishing Company, Inc., Ithaca, N. Y.

Another New Generic Entity of the Gerridae (Heteroptera)[1]

By HERBERT B. HUNGERFORD and RYUICHI MATSUDA,
Department of Entomology, University of Kansas,
Lawrence, Kansas

We have in the Francis Huntington Snow Museum of the University of Kansas three apterous specimens of a gerrid, two males and one female, that came from Sretensk, Siberia, and were determined as *Gerris brachynotus* Horváth by Dr. A. N. Kiritschenko. *Gerris brachynotus* was described from Gabritza, Eastern Siberia.

At the present time we are unable to examine the type and cannot therefore verify the determination. However, we are convinced these three specimens are not congeneric with Gerris and should be described as a new genus.

[1] Contribution No. 1,017 from the Department of Entomology, University of Kansas. This study is a by-product of a project aided by a grant from the National Science Foundation.

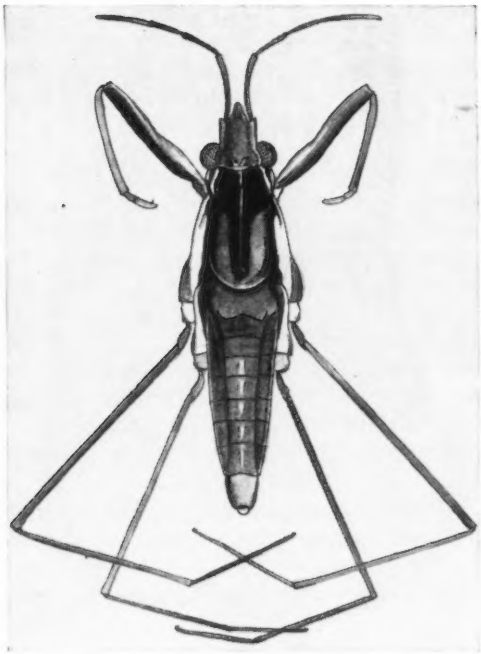

FIG. 1. Dorsal view of a wingless male of *Gerriselloides brachynotus* (Horváth)

GERRISELLOIDES nov. gen.

(Figures 1 and 2)

Type species of the genus: *Gerriselloides brachynotus* (Horváth)

Spindle shaped gerrids. Antennae and beak short. Third segment of beak barely reaching mesosternum. Pronotum short but covering mesonotum. Median longitudinal sulcus of metanotum absent. Mesosternum relatively short; compared to metasternum only about twice as long. Metasternum long, with omphalium and omphalial groove reaching metaacetabula. Rela-

tive length of hind tibia to tarsus shorter than in any species of *Gerris*. Middle and hind legs relatively stout.

There are other gerrids that have a short pronotum, as in *Eurygerris*, but it does not reach the posterior margin of the

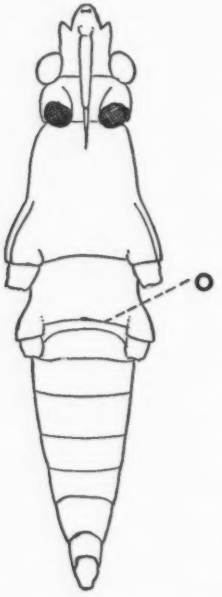

FIG. 2. Ventral view of a male of *Gerriselloides brachynotus*. (Horváth). O is the omphalial groove.

mesonotum in those species. The short mesosternum is a striking character. In no species of *Gerris* is the mesosternum less than two and a quarter times as long as the metasternum. The omphalial groove is also a generic character in the Gerridae, either all species of a genus have it as in *Cylindrostethus, Potamobates* and *Brachymetra* etc., or they all lack it.

The Nymph of Tanypteryx hageni Selys (Odonata)

By Arthur Svihla, Department of Zoology, University of Washington, Seattle 5, Washington

For the past four years a search has been made in the Mount Hood region of Oregon for the nymph of this rare dragon-fly, the only representative of the archaic Petaluridae in western North America. During these four years numerous adults of both sexes were observed and collected in that area but the nymph eluded discovery.

On July 8, 1958, an exuvia of this dragon-fly was found attached to the base of the sedge, *Carex ablata,* at Tipsoo Lake (5,200 feet) in Mount Rainier National Park, Washington. Further search in the vicinity revealed the habitat as well as the presence of numerous nymphs in various stages of development.

The habitat of the nymph of this dragon-fly is very restricted and specialized, for extensive search covering an area of several square miles failed to reveal additional sites. Notes on the habitat, ecological environment and life history will be reported upon in another paper.

A total of 7 exuviae, 4 ♂♂ and 3 ♀♀, as well as several nymphs (to be reared in the laboratory) have been collected from this site. Many others were left in situ for further observation.

On August 6, 1958, the Mount Hood region was revisited and at Still Creek Forest Camp (4,200 feet), Mt. Hood, Oregon, the nymphs were also found.

Description of Exuviae and Nymphs

The body is subcylindrical, hairy and so encrusted with muddy substances that the coloration is obscured.

The measurements are based upon 7 exuviae, 4 ♂♂ and 3 ♀♀. The descriptions are also based on these exuviae as well as on live nymphs.

Total length: 26–31 mm., average 27.5 mm. Head: almost twice as broad as long, width at eyes 6.7–7.5 mm., average 7.03 mm.; length 3.5–4.25 mm., average 3.84 mm. Eyes: large and well forward; a transverse line touching anterior edge of eyes passes through first segment of antennae to the superior part of the frons. Frons: a truncated triangle meeting dorsally the roughly circular vertex which has two laterally located tufts of long hair. Occiput has a small tuft of long hair just behind each eye. Another tuft is located at the posterior lateral edges. Antennae: short, total length 2.5 mm., depressed and slightly incurved, six segmented, relative segment length 2–3–4–2–3–3; scape short and robust; pedicel almost globular (this is especially so in the live nymphs); flagellum slender; all segments with long hairs. Labium: large; lateral and median lobes fitting together to form a shovel; hinge of labial mask reaching base of mesothoracic legs. Mentum: almost as long as wide, 5 × 5.25 mm.; width at base of lateral lobes 5.25 mm., at hinge 3.5 mm.; ventral mid-line a shallow groove; dorsal surface sparsely spined; numerous long hairs at margin of base of median lobe. Median lobe: bare, extending slightly forward, with approximately 15 strong denticulations on each side, those nearest the median cleft largest and projecting forward; medial cleft, narrow but conspicuous. Lateral lobes: hollow, truncate, inner and apical margins minutely denticulate; a short strong spine located dorsally along edge of lobe at base of moveable spine; moveable spine moderately slender, 1.5 mm. long and tapering gradually.

Abdomen: spindle-shaped, length 15–20 mm., average 17.4 mm., widest at segments 5–6, tapering posteriorly; posterior edges of segments fringed with short hairs. No dorsal hooks but commencing on segment 5 and extending to segment 9 are four pairs of conspicuous submedian hair tufts. The two tufts on each side are close together with the outer one larger than the inner but widely separated from the pair on the opposite side. In young nymphs of 23 mm. length these four tufts of hair are found on the first four segments as well. Possibly as the wing sheaths grow and develop they rub off those on the first four

segments. In some of the exuviae the outermost tuft is sometimes present on the fourth segment. Abdominal margins fringed with long hairs; no lateral spines present, instead, the posterior lateral regions of the segments are rounded. Ventral surface of segments 2–9 with a pair of submedian parallel grooves which separate each segment into a smooth central more convex area and a narrower lateral rougher flat portion. On segment 9 this groove flares outward. All surfaces are hairy.

Wing sheaths laid parallel; hind wings extending posteriorly to segment 4; front wings to segment 3. Legs: robust, femora length of pro-meso- and metathoracic legs, 3.5–4 and 6 mm. respectively. All legs fringed with hairs; those on the dorsal ridge of the femora and tibiae longer. Tibiae end in 4 hairy stout spines. Tarsal formula 3–3–3. Third tarsal segment almost twice as long as first two and terminating in two sharp recurved claws.

Caudal appendages prominent. Shape of adult male inferiors foreshadowed in the larval middle dorsal appendage as a broad flat wing with three irregular conical projections, the two lateral projections being the largest. Numerous hairs are located between the two lateral projections and almost conceal the shorter median conical projection. On the sternum of the 9th segment are two short longitudinal elevated projections, the posterior parts of which are covered with hairs. In between these projections is a smaller black oval disc with the genital opening in the middle. These structures develop into the two medianly located flaps or valvules in the adult male. The forerunners of the male copulatory apparatus are present as black and brown patches on the posterior part of the 2nd segment and the anterior part of the 3rd sternum. In the female the ovipositor is visible on the sternum of segment 9. The sternum of segment 10 and the dorsal appendages of both the male and female are covered with long hairs.

Comparisons and Remarks

The nymph of *Tanypteryx hageni* is the smallest of all of the known nymphs of the Petaluridae.

Tanypteryx hageni	26–31 average 27.5 mm.
Tanypteryx pryeri	30–38
Tachopteryx thoreyi	38
Uropetala carovei chiltoni	40–50 average 44 mm.
Phenes raptor	48
Petalura gigantea	55

The nymphs of *Tanypteryx hageni* and *T. pryeri* are similar in having 6 segmented antennae, a short spine at the base of the large moveable spine on the lateral lobes of the labium, the median lobe projecting forward slightly and being of the same general shape.

The nymph of *Tanypteryx hageni* differs from that of *T. pryeri* in being smaller; having no abdominal spines; the hinge of the mentum extending back to the base of the mesothoracic legs rather than only to the prothoracic legs; the labial mask almost as long as it is wide rather than wider than long; the hind wing buds extending down only to the 4th abdominal segment rather than down to the 5th; and the pedicel of the antennae more globular in shape than it apparently is in *T. pryeri.*

The nymph of *Tachopteryx thoreyi* which is the eastern United States member of the Petaluridae differs from that of *Tanypteryx hageni* by having 7 segments in the antennae, no spine at the base of the moveable spine and the hair tufts on the abdomen located on tubercles.

Except for the marked difference in size of the two, the nymph of *T. hageni* is quite similar to the nymph of *Uropetala carovei chiltoni* of New Zealand in many characters, such as the 6 segmented antennae, rounded lateral edges of the abdominal segments, spine at the base of the moveable spine of the labium, labial mask as long as wide and the mentum extending down posteriorly to the base of the mesothoracic legs. *Uropetala carovei chiltoni* is less hairy than *T. hageni.*

The nymphs of *T. hageni* and *Phenes raptor* of Chile are similar in having 4 tufts of hair on each abdominal segment, but differ from each other in that the tufts are not located on tubercles in *T. hageni* as they are in *Phenes raptor.*

The six known petalurid nymphs may be separated by the following characters:

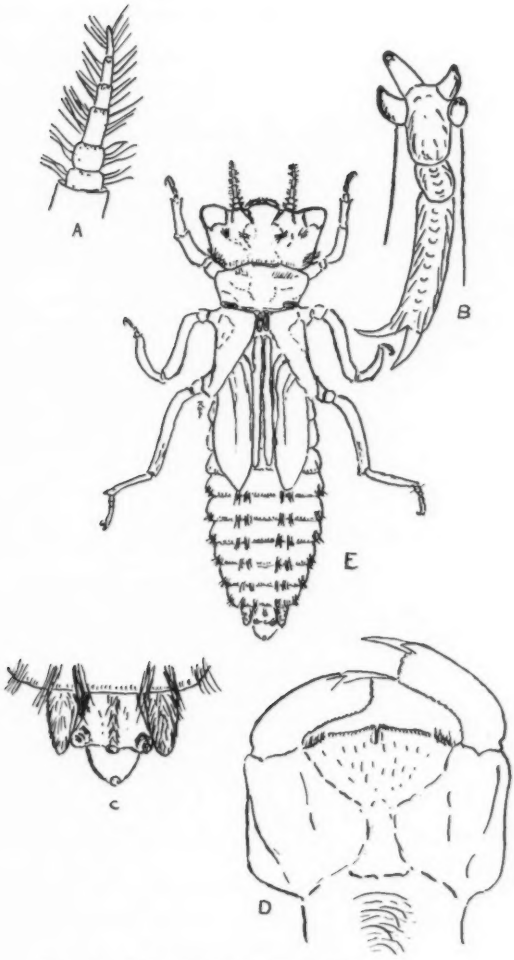

FIG. A. Right antenna, dorsal view
FIG. B. Tibial spurs and tarsus
FIG. C. Caudal appendages of male, dorsal view
FIG. D. Labium, dorsal view
FIG. E. Nymph drawn from exuvia

I. Lateral lobes of labium truncate, apical and inner borders denticulate.
  A. Median lobe triangular, projecting forward..... .....*Uropetala carovei*
  B. Median lobe not triangular, straight.
    1. Hairy tubercles on abdomen.
      a. 7-segmented antennae, no short spine at base of moveable spine, 2 hair tufts on abdominal segments.....*Tachopteryx thoreyi*
      b. 6-segmented antennae, short spine at base of moveable spine, 4 hair tufts on abdominal segments.....*Phenes raptor*
    2. No hairy tubercles on abdomen.
      a. Lateral spines on abdomen present, 2 hair tufts on abdominal segments.....*Tanypteryx pryeri*
      b. Lateral spines on abdomen absent, 4 hair tufts on abdominal segments....*Tanypteryx hageni*

II. Lateral lobes of labium concave, inner borders curved, median lobe triangular.....*Petalura gigantea*

American Entomological Society Centennial

Early in 1958 a Committee was appointed by President H. W. Allen to investigate ways and means of properly celebrating the Society's 100th anniversary, which occurs in March 1, 1959. The plans of this Committee, as approved by the Council, provide for a variety of activities. Several well known entomologists have been invited to contribute papers for a Centennial Number of our "Transactions." In this same number will appear a brief history of the Society from 1909 to the present, a report on its library, and a review of its extensive collections. The planning committee has already secured funds sufficient to meet costs of this number.

A Celebration is planned for March 26, 1959, at the headquarters of the Society in the Academy of Natural Sciences of Philadelphia. At this time it is hoped that a brief program of afternoon events will be presented and that visitors will have the opportunity of inspecting the Society's collections and library. Members, their guests and other visitors are urged to

attend the Society's headquarters when in Philadelphia during the Centennial Year.

Hungerford Leidy Medalist

Dr. HERBERT B. HUNGERFORD, Corresponding Member of the American Entomological Society, was the recent recipient of the Leidy Medal given by the Academy of Natural Sciences of Philadelphia. The medal, with an honorarium, is awarded every three years under the terms of the Joseph Leidy Memorial, which was created in 1923. It is given "as a reward for the best publication, exploration and discovery of research in the natural sciences in such particular branches thereof as may be designated."

The Committee which chose Dr. Hungerford was composed of the following members: Dr. Reed C. Rollins, Harvard; Dr. W. Frank Blair, University of Texas; Dr. Philip A. Munz, Rancho Santa Ana Botanic Garden; Prof. Evelyn Hutchison, Yale; Dr. H. Radclyffe Roberts, Academy of Natural Sciences of Philadelphia.

Dr. and Mrs. Hungerford traveled to Philadelphia to receive the award, which was presented by the Academy's President at a ceremony on October 23, 1958.

The Society extends its heartiest congratulations to Dr. Hungerford for this recognition of his masterful work in the systematics of the acquatic Hemiptera.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleign, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

INDEX TO VOLUME LXIX

(* Indicates new genera, names, etc.)

ALEXANDER, C. P. Undescribed species of crane-flies from the western United States and Canada (Dipt. Tipulidae) Part XVII 129
Idem. Part XVIII 215

ARNAUD, P. H. *Cressonomyia* new name for *Plagiopsis* Cresson preoccupied (Diptera: Ephydridae) 24

BLICKLE, R. L. Eye color of male *Dichlorus ferrugatus* (Fabr.) (Diptera, Tabanidae) 230

BROWN, W. L., JR. (See under Wilson, E. O.)

BURKS, B. D. Three species of *Eurytoma* important in biological control of weeds (Hymenoptera, Eurytomidae) 177

BYERS, G. W. Individual identification labels for pinned insect specimens 113

CHAMBERLIN, R. V. A new Lysiopetalid diplopod from Arizona 121
Some records of chilopods from Florida 13

CLARKE, J. F. G. A new genus and two new species of Microlepidoptera from Japan 1

CRABILL, R. E., JR. A new Schendylid from the eastern United States, with notes on distribution and morphology. (Chilopoda: Geophilomorpha: Schendylidae) 153

CRABILL, R. E., JR. On a collection of centipedes from Wisconsin (Chilopoda) 93
Report of *Geophilus proximus* in North America, with a key to its eastern North American congeners (Chilopoda: Geophilomorpha: Geophilidae) 15

DREISBACH, R. R. Three new species of *Haploneurion* Kohl (Hymenoptera: Psammocharidae) from Chile 207
Two new species in the genus *Pomphilinus* (Hymenoptera: Psammocharidae) with photomicrographs of the genitalia and subgenital plate of the male 61

EHRLICH, P. R. Lepidoptera collected in the tundra-taiga ecotone at Kotzebue, Alaska 17
ELBEL, R. E. (See under Emerson, K. C.)
EMERSON, K. C. Designation of a lectotype of *Goniodes minor* Piaget (Philopteridae: Mallophaga) 6
EMERSON, K. C. and R. E. ELBEL. A new species and subgenus of *Kurodaia* (Mallophaga) 29
EVANS, H. E. Observations on the nesting behavior of *Larropsis distincta* (Smith) (Hymenoptera, Sphecidae) 197
Some previously undescribed males and new sex associations in the Pompilinae (Hymenoptera: Pompilidae) .. 147
FROST, S. W. *Halysidota tessellaris* S & A and pollenia .. 137
Papers by S. W. Frost 67
The ecological insect survey of Pennsylvania 222
GANGWERE, S. K. Grooming behavior in Orthoptera 123
HALL, J. C. A change of name in the Bombyliid genus *Anastoechus* (Diptera) 195
HOOD, J. D. *Acanthothrips palmi,* a new thrips from Brazil (Thysanoptera: Phlaeothripidae) 117
HUBBARD, C. A. Mexican jungle and desert fleas with three new descriptions 161
HULL, F. M. Some robber flies (Diptera: Asilidae) 99
Some species of the genus Bathypogon Loew 187
HUNGERFORD, H. B. and R. MATSUDA. A new genus for *Gerris euphrosyne* Kirkaldy (Heteroptera, Gerridae) .. 225
Another new generic entity of the Gerridae (Heteroptera) 258
Terobates Esaki, a synonym of *Heterobates* Bianchi (Gerridae, Heteroptera) 200
JUDD, W. W. Gall flies (Itonididae) and parasitic Hymenoptera reared from rosette galls of willow 39
Studies of the Byron Bog in southwestern Ontario. VI. Seasonal distribution of the wood gnat, *Silvicola marginata* (Say) (Diptera: Silvicolidae) 65

KANNOWSKI, P. B. Swarming of the ant *Stenamma brevicorne* (Mayr) 231
KEMPF, W. W. Synonymic note on ants of the genus *Paracryptocerus* Emery (Hymenoptera: Formicidae) .. 108
KNULL, J. N. A new species of *Conophaeron* Linsley from Arizona (Coleoptera: Cerambycidae) 185
KORMONDY, E. J. The plesiallotype female of *Oligoclada umbricola* Borror, 1931 57
KROMBEIN, K. V. *Pison* (*Paraceramius*) *koreense* (Rad.), a new adventive wasp in eastern United States (Hymenoptera, Sphecidae) 166
LAUCK, D. R. and W. G. WHEATCROFT. Notes on a new habitat for Nerthra (Gelastocoridae-Hemiptera) 20
LIPA, J. J. Some observations upon the fauna of the winter nests of *Euproctis chrysorrhoea* (Lepidoptera) 60
MATSUDA, R. (See under Hungerford, H. B.)
MEDLER, J. T. Parasitism of bees in trap-nests by *Leucospis affinis* Say (Hymenoptera: Leucospidae) 21
MOURE, J. S. On the bee genus *Cyphomelissa* 191
On the genus *Arhysosage* Brèthes from Argentina (Hym., Apoidea, Panurginae) 43
MUESEBECK, C. F. W. Three new aphid parasites from the Pacific coast (Hymenoptera: Braconidae, Aphidiinae) 141
PARFIN, S. Notes on the bionomics of the Mantispidae (Neuroptera: Planipennia) 203
REHN, J. A. G. Review: Annotated catalogue of African grasshoppers 80
REINHARD, H. J. New American Tachinidae 233
SABROSKY, C. W. New species and note on North American acalyptrate Diptera 169
SCHMIEDER, R. G. Review: Studies on the comparative ethology of digger wasps of the genus Bembix 111
Velia's clock 26

SVIHLA, A. The nymph of *Tanypteryx hageni* Selys (Odonata) 261
SWARTZENDRUBER, D. C. The permeability of certain of the sensory hairs on the antennae of lacewings (Neuroptera: Chrysopidae) 253
THEW, T. B. Dodds's types of two species of *Callibaetis* (Ephemeroptera) 137
WEBER, N. A. Nomenclatural changes in *Trachymyrmex* (Hym.: Formicidae, Attini) 49
Nomenclatural notes on *Proatta* and *Atta* (Hym.: Formicidae) 7
Synonymies and types of *Apterostigma* (Hym. Formicidae) 243
WHEATCROFT, W. G. (See under Lauck, D. R.)
WILLIAMS, J. L. Notes on the 17-year locust on Cape Cod in 1957 25
WILSON, E. O. and W. L. BROWN, JR. The worker caste of the parasitic ant *Monomorium metoecus* Brown and Wilson, with notes on behavior 33
WOOLLEY, T. A. A key to the superfamilies and principal families of the Oribatei (Sarcoptiformes: Acarina) 85

GENERAL SUBJECTS

American Entomological Society Centennial 79, 267
Bembix, comparative ethology of 111
Bibliography of S. W. Frost .. 67
Biological control 177
Budapest, Hymenoptera in Museum 78
Centennial News 79, 267
Grooming behavior in Orthoptera 123
Hemming, F., retirement of .. 139
International Congress 195
Labels for specimens, individual 113
Laboratory training class 139
Leidy Medal to Hungerford .. 266
Nomenclature, Colloquium on. 26
Notice on 55
International Commission on 139
Orientation behavior in Velia. 26
Pennsylvania insect survey ... 222
Pollenia on Halysidota 137
Subscription rate, increase of . 146
Sensory hairs, permeability of 253
Swarming of ants 231
Tenth International Congress . 195
Velia's clock 26

PERSONALS

de Beer, G. 139
Hemming, F. 139
Hungerford, H. B. 266
Melville, R. V. 139

REVIEWS

Books received 83
Evans, H. E. Studies on the comparative ethology of digger wasps of the genus Bembix 111
Uvarov, B. P. Annotated catalogue of African grasshoppers 80

GEOGRAPHICAL DISTRIBUTION

Alaska: Lep. 17
Argentina: Hym. 46, 48
Arizona: Col. 186, Diplop. 122; Dipt. 108, 217
Australia: Dipt. 188, 190, 191
Brazil: Dipt. 106; Hym. 193, 194; Thysan. 121
British Columbia: Hym. . 142, 145
California: Dipt. 130, 133, 136, 221; Hym. 144
Chile: Hym. 210, 212, 213
Colorado: Dipt. 135, 220
Florida: Chilop. 13; Dipt. ... 242
Idaho: Dipt. 217
India: Hym. 185
Indiana: Dipt. 173
Japan: Lep. 1
Kansas: Hym. 62
Massachusetts: Dipt. 238
Mexico: Dipt. 235, 236, 241; Siphon. 161
Montana: Dipt. 132
Nevada: Dipt. 219
New York: Hym. 64
Solomon Is.: Dipt. 102
Thailand: Malloph. 31
Trinidad: Hym. 179
Virginia: Dipt. 234
West Virginia: Dipt. 240
Wisconsin: Chilop. 93; Dipt. . 170
Mexico: Dipt. 235, 236, 241

COLEOPTERA

Calandra (Calendra) 55
pullum, Conosphaeron* 185

DIPTERA

acutangula, Leptocera 175
aperta, Paralispidia* 237

arapaho, Ormosia* 134
arapahoensis, Molophilus* 219
arctica, Piophila 174
argyrocephala, Metopia 199
carrerae, Lycosimyia* * 103
Chymedax * 99
Cressonomyia * 24
curialis, Clairvillia* 235
Cyamops, key to genus 169
decumata, Hemyda* 235
delicatulus, Chymedax* * 100
deserticola, Anastoechus 195
dirhaphis, Molophilus* 221
doloma, Aplomya* 239
erotema, Nephoteropsis* 238
evanida, Phillophilopsis* 233
ferrugatus, Dichlorus 230
flava, Stomosis* 172
floscula, Thelairodoria* 241
fulviceps, Piophila 174
halterata, Cyamops* 170
hessei, Anastoechus,* new name 195
homichlophila, Limonia* 129
ichthyurus, Bathypogon* 187
indigena loloensis, Limonia* .. 217
innominata, Stomosis, n.comb. 171
Itonididae from willow galls .. 39
kuschei, Limonia* 215
Leptocera, key to species 176
lewisiana, Pedicia* 131
Lycosimyia * 102
marginata, Silvicola 65
microdonturus, Bathypogon* . 191
nebulosa, Cyamops 170
nevadensis, Limnophila* 218
nigrotibiatus, Bathypogon* 188
nitidifrons, Plagiops 24
ochripes, Leptocera 176
oligacanthus, Molophilus* 135
Rhabdophaga (*rhodoides* Walsh?) 39
Sarcophagidae, in Mantispid .. 206
sierrensis, Paradelphomyia* .. 132
Stomosis, key to species 171
subita, Hypertophomma* 240
trilineata, Senotainea 199
unicolor, Diogmites* 106

HEMIPTERA

brachynotus, Gerrisseloides * . 259
euphrosyne, Gerris 225
Gerriselloides * 259
Heterobates 200
manni, Nerthra 20
Nerthra, habitat of 20
Velia, behavior and internal clock of 26
Tenagogeris * 226
Terobates 200

HOMOPTERA

septendecim, Tibicen 25

HYMENOPTERA

affinis, Leucospis 21
alius, Aphidius* 142
Amblymerus (salicis (Grt.)?) 40
Ants, swarming of 231
Aporini, generic limits of 152
Arhysosage 43
Atritomellus 42
Atta 8
attiva, Eurytoma* 177
auriculatum, Apterostigma ... 243
auriculatum icta, Apterostigma *auriculatum petiolatum, Apterostigma* 244
Bembix, book on 111
bequaerti, Aporus 149
billi, Apterostigma 244
bolivianum, Apterostigma 245
brevicorne, Stenamma 231
bullocki, Haploneurion* 210
butteli, Proatta 7
calverti, Apterostigma 245
cephalotes isthmicola, Atta ... 9
cephalotes lutea, Atta 10
cephalotes opaca, Atta 10
cephalotes polita, Atta 11

chalybii, Melittobia 21
chilensis, Haploneurion* 209
clavipes, Pompilinus* 61
collare, Apterostigma 246
columbica, Atta 11
columbica tonsipes, Atta 12
commata, Cyphomelissa* 194
conspersus, Paracryptocerus .. 108
cornetzi, Trachymyrmex 49
cressoni, Eurytoma 180
cucumis, Trachymyrmex* 50
Cyphomelissa, key to 194
dentigerum, Apterostigma ... 246
distincta, Larropsis 197
drakei, Pompilinus* 62
farinosus, Trachymyrmex 51
flava, Arhysosage* 45
germana, Arhysosage* 47
Haploneurion, key to 207
Hymenoptera from willow galls 40
Hymenoptera of Budapest Museum 78
ierense, Apterostigma 247
inermis, Megachile 23
koreense, Pison, in the U. S. . 166
Larropsis, nesting habits 197
luederwaldti, Apterostigma ... 247
magnifica, Cyphomelissa* 192
mayri, Apterostigma 248
meteocus, Monomorium 33
minutus, Paracrytocerus 110
Nesting behavior of Larropsis 197
nitidus, Haploneurion* 212
ochracea, Arhysosage 44
opulenta, Trachymyrmex* 51
Paracrytocerus, synonymies in 108
Platygaster 42
perfasciatus, Pompilus 147
pigra, Eurytoma* 183
pilosum, Apterostigma 248
ponderosae, Aphidius* 141
producta, Hoplitis 23
relativa, Megachile, parasites of 21
robustum, Apterostigma 249
saussurei, Trachymyrmex 52
schlingeri, Trioxys* 144
scululatus, Paracryptocerus .. 110
septentrionalis, Trachymyrmex 52
Stelis 23
Tetrostichus 40
Torymus sp. 40
tramitis, Apterostigma 249
urichi, Apterostigma 250
urichi, Trachymyrmex 53
Vespidae, Mantispid parasites of 204
wasmanni, Apterostigma 251
wheeleri, Trachymyrmex* 54
zeteki, Trachymyrmex 55

LEPIDOPTERA

Alaska, Lepidoptera from 17
Noctuidae, Mantispid parasites of 204
Paralida* 1
sapindivora, Chelaria* 4
tessellaris, Halysidota 137
triannulata, Paralida* 1

ODONATA

hageni, Tanypteryx, nymph of 261
umbricola, Oligoclada 57

ORTHOPTERA

Acridoidea, Review of book .. 80
fasciatus, Nemobius 199
Grooming behavior 123

SMALLER ORDERS

boonsongi, Kurodaia (*Falcomenopon**) (Mallophaga) . 30
Chrysopa, sensory hairs, permeability of 254
Falcomenopon* (Mallophaga) 30
fuscicornis, Mantispa (Neuroptera) 204

fuscus, Callibaetis (Ephemeroptera) 137
grayi, Jellisonia* (Siphonaptera) 163
ignota chapmani, Foxella* (Siphonoptera) 164
interrupta, Mantispa (Neuroptera) 204
linni, Kohlsia* (Siphonaptera) 162
Mantispidae, bionomics of (Neuroptera) 203
minor, Goniodes (Mallophaga) 6
Neuroptera, sensory hairs in . 254
nigricornis, Chrysopa (Neuroptera) 254
oculata, Chrysopa (Neuroptera) 254
palmi, Acanthothrips* (Thysanoptera) 117
plorabunda, Chrysopa (Neuroptera) 254
signata, Plega (Neuroptera) . 204
Siphonaptera, Records of Mexican 161
styriaca, Mantispa (Neuroptera) 204
varia, Symphrasis (Neuroptera) 204
viridis, Mantispa (Neuroptera), bionomics of 203
vitreus, Callibaetis (Ephemeroptera) 137

NON–HEXAPODA

ACARINA

Oribatei, key to families of ... 5

ARANEAE

Paratism of, by Mantispa 203

CHILOPODA

alternans, Scholopendra 14
brevilabiatus, Orphnaeus 14
Chilopoda from Wisconsin ... 93
denmarki, Cryptops* 13
Geophilus, key 15
longipes, Rhysida 14
maxillaris, Mecistocephalus ... 14
mordax, Geophilus 14
pholeter, Nyctunguis,* with notes on morphology 154
proximus, Geophilus 15
viridis, Scolopendra 14

DIPLOPODA

yuma, Colactis* 121

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